

# World's first implanted bionic arm on test in global competition

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Cybathlon participant Magnus at a practice session in July. Credit: Chalmers University of Technology

A few years ago, a patient was implanted with a bionic arm for the first time in the world using control technology developed at Chalmers University of Technology. He is now taking part in Cybathlon, a new international competition in which 74 participants with physical disabilities will compete against each other, using the latest robotic prostheses and other assistive technologies – a sort of 'Cyborg Olympics'.

The Paralympics will now be followed by the Cybathlon, which takes place in Zürich on October 8th. This is the first major competition to show that the boundaries between human and machine are becoming more and more blurred. The participants will compete in six different disciplines using the machines they are connected to as well as possible.

Cybathlon is intended to drive forward the development of prostheses and other types of assistive aids. Today, such technologies are often highly advanced technically, but provide limited value in everyday life.

Magnus, one of the participants, has now had his biomechatronically integrated arm prosthesis for almost four years. He says that his life has totally changed since the implantation, which was performed by Dr Rickard Brånemark, associate professor at Sahlgrenska University Hospital.

"I don't feel handicapped since I got this arm", says Magnus. "I can now work full time and can perform all the tasks in both my job and my family life. The prosthesis doesn't feel like a machine, but more like my own arm."

Magnus lives in northern Sweden and works as a lorry driver. He regularly visits Gothenburg in southern Sweden and carries out tests with researcher Max Ortiz Catalan, assistant professor at Chalmers University of Technology, who has been in charge of developing the technology and leads the team competing in the Cybathlon.

"This is a completely new research field in which we have managed to directly connect the artificial limb to the skeleton, nerves and muscles," says Dr Max Ortiz Catalan. "In addition, we are including direct neural sensory feedback in the prosthetic arm so the patient can intuitively feel with it."

Today Magnus can feel varying levels of pressure in his artificial hand, something which is necessary to instinctively grip an object firmly enough. He is unique in the world in having a permanent sensory connection between the prosthesis and his nervous system, working outside laboratory conditions. Work is now under way to add more types of sensations.

At the Cybathlon he will be competing for the Swedish team, which is formed by Chalmers University of Technology, Sahlgrenska University Hospital and the company Integrum AB.

The competition has a separate discipline for arm prostheses. In this discipline Magnus has to complete a course made up of six different stations at which the prosthesis will be put to the test. For example, he has to open a can with a can opener, load a tray with crockery and open a door with the tray in his hand. The events at the Cybathlon are designed to be spectator-friendly while being based on various operations that the participants have to cope with in their daily lives.

"However, the competition will not really show the unique advantages of our technology, such as the sense of touch and the bone-anchored attachment which makes the prosthesis comfortable enough to wear all day," says Max Ortiz Catalan.

Magnus is the only participant with an amputation above the elbow. This naturally makes the competition more difficult for him than for the others, who have a natural elbow joint.

"From a competitive perspective Cybathlon is far from ideal to demonstrate clinically viable technology," says Max Ortiz Catalan. "But it is a major and important event in the human-machine interface field in which we would like to showcase our technology. Unlike several of the other participants, Magnus will compete in the event using the same

technology he uses in his [everyday life](#)."

Provided by Chalmers University of Technology

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